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BACKGROUND INFORMATION FOR STANDARDS OF PERFORMANCE: PRIMARY ALUMINUM INDUSTRY. VOLUME 3: SUPPLEMENTAL INFORMATION

Environmental Protection Agency
Research Triangle Park, North Carolina

January 1976

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16. ABSTRACT

This volume is the third in a series on standards of performance for primary aluminum plants. This volume includes the proposed regulation comments and Agency responses to these comments, updated economic impact information, and a discussion of problems encountered with the analytical method for sampling emissions.

17. KEY WORDS AND DOCUMENT ANALYSIS		
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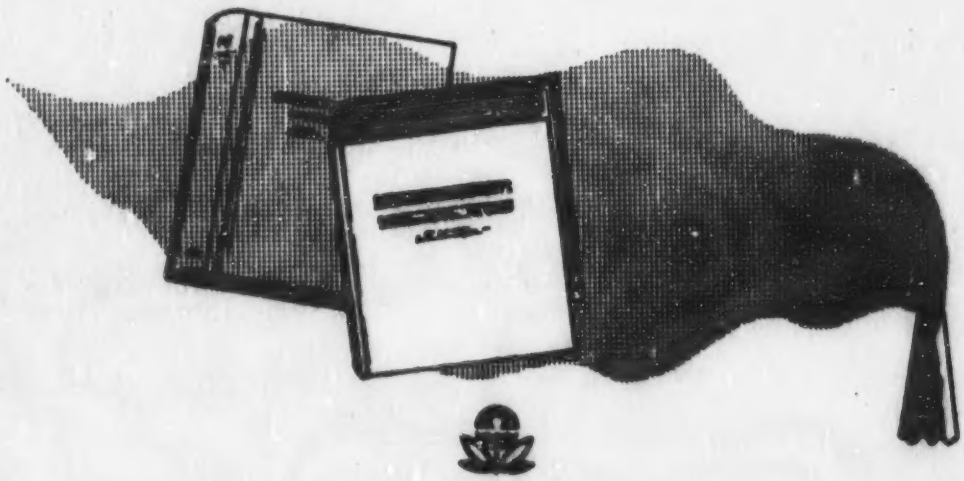

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Emission Standards and Engineering Division

U.S. ENVIRONMENTAL PROTECTION AGENCY
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I. Inflationary Impact of the Standards*

Based on the economic analysis and data appearing in Volume 1 of Background Information for Standards of Performance: Primary Aluminum Industry (hereafter the "background document") and other available information, the following conclusions may be drawn:

1) Growth in total domestic primary aluminum capacity and supplies will not be adversely affected by the promulgated standards.

2) The promulgated standards will accelerate the current industry trend to prebake cells and away from Soderberg cells.

3) The standards are expected to result in an investment cost increase at new primary aluminum plants of approximately $95[1/] per ton of capacity (first quarter, 1975) or approximately eight percent of the cost of a new uncontrolled plant. With an expected growth rate of approximately seven percent per year in domestic aluminum capacity, this translates into a total additional capital requirement of approximately $180 million over a five-year period.

It should be noted that existing primary aluminum plants are not totally uncontrolled even though many States do not specifically

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* Executive Order 11821 (39 FR 41501, Nov. 29, 1974) requires evaluation of the inflationary impact of certain Federal actions. For that purpose, the information presented here supplements the economic analysis appearing at pages 41-93 of Volume 1 of Background Information for Standards of Performance: Primary Aluminum Industry (EPA 450/2-74-020a, October 1974) which was prepared prior to the issuance of Executive Order 11821.

require control of fluoride emissions to the air. Existing control levels are estimated to require average investment costs of approximately $65[1/] per ton of aluminum capacity. Viewed as an incremental cost, then the promulgated standards would require an investment cost increase over the current industry average of only $30 per ton of capacity, or $57 million over a five-year period.

4) The standards are expected to result in an annualized cost increase at new primary aluminum plants of approximately 0.82¢/lb[1/] of aluminum produced (assuming no existing State control requirements would apply). A total annualized cost increase of approximately $31 million in the fifth year is expected to result from the imposition of the standards (making the same assumption). If the entire cost increase referred to above were passed on to consumers it would amount to a price increase of 2.1 percent of current prices. Allowing a pre-tax return on the pollution control capital of 20 percent would result in a total price increase of approximately 1.8¢/lb of aluminum or 4.6 percent of current prices.

The level of cost for control of fluoride emissions to the air currently being incurred by the industry averages approximately 0.70¢/lb[1/] of aluminum. The standards of performance, then, will require a cost increase over the average existing plant of only 0.12¢/lb, or 0.3 percent of current prices. If a pre-tax return on pollution control capital of 20 percent is assumed for existing plants, then this means that approximately 1.4¢[1/] of the current 39¢/lb aluminum price is attributable to air pollution control expenditures. The price differential that is attributable to the standards would then

amount to approximately 0.4¢/lb of aluminum or 1.0 percent of current prices.

Capital and annualized cost increases of the level of magnitude referred to above are believed to be too small to have a measurable impact on the overall level of inflation. A recent study by Chase Econometrics Associates, Inc.[2/] on the impact of pollution control expenditures on the economy indicated that in 1978 the wholesale price index would be 3.0 percent higher than what it would have been in the absence of pollution control expenditures. This figure reflects the impact of spending a total for all industries of approximately $56 billion in capital costs and $55 billion in annualized costs over the period 1973-1977 for control of both air pollution and water pollution. Similarly, the consumer price index would be 1.2 percent higher and the implicit GNP deflator would be 1.9 percent higher as a result of these expenditures. It is obvious that the much smaller costs necessitated by the standards for aluminum plants would have no measurable impact on these indices of national inflation.

5) The standards would result in the reduction of fluoride emissions to the air of approximately 48 pounds of fluoride per ton of aluminum produced (96 percent) in the case of an uncontrolled plant and 11 pounds per ton of aluminum produced (85 percent) in the case of a plant employing the industry's current average level of control.

6) With regard to other economic considerations (secondary price effects, employment, productivity, competition, tax collections, balance of payments, and investment of non-environmental assets) the standards are expected to have little or no impact. Although it is not possible to accurately assess the community and regional implications of the standards, it is believed that these impacts would also be minimal or non-existent. Finally, no plant closings or production curtailments are expected to result from the imposition of the standards.

The background document also includes analysis of the economic effects of several alternative standards that were considered. The probable economic effects of these alternative standards can be summarized as follows:

1) Emission limitations that are more stringent than the promulgated standard would tend to discriminate against the small market entrant that is without existing capacity in favor of the large, established, integrated producer.

2) More stringent controls would tend to encourage a greater amount of imports than would otherwise be the case and would encourage the construction of primary aluminum capacity in other countries rather than in the United States.

3) More stringent controls could result in appreciably higher prices for primary aluminum than would otherwise be the case.

Energy Impact of Standards

The energy requirements for air pollution control systems currently in use at existing primary aluminum plants and the energy

requirements to meet the 1983 EPA effluent guidelines at these plants have been estimated to total 285 kwh/ton of aluminum produced (industry-wide average). However, the energy requirements for a new prebake plant (only prebake plants are expected to be built) have been estimated at 211 kwh/ton of aluminum produced. Therefore, new plants will be using approximately 25 percent less energy than existing plants in meeting applicable pollution control regulations. This will be due mainly to the use of air pollution control systems which do not cause water pollution problems.

1/ Costs presented in the background document have been escalated to current levels by use of the Chemical Engineering Index as follows (January 1972 Index = 137, March 1975 Index = 181):

$$\text{Original cost value} \times \frac{181}{137} = \text{New cost value}$$

2/ The Macroeconomic Impacts of Federal Pollution Control Programs, Chase Econometrics Association, Inc., January, 1975. (Contract No. EQ 5AC002).

II. Public Comment Summary: Primary Aluminum Industry

On October 23, 1974 (39 FR 37730) the Administrator proposed standards of performance for new and modified primary aluminum reduction plants. After proposal, interested persons participated in the rulemaking by submitting written comments to EPA. The comments received and EPA's responses to these comments are summarized in this section. The comments were carefully considered and, where determined by the Administrator to be appropriate, revisions were incorporated into the regulations.

Note: As discussed ~~in~~ the preamble to the final regulations, the proposed 2.0 lb TF/TAP standard for prebake plants has been split into separate standards for potroom groups (1.9 lb TF/TAP) and for anode bake plants (0.1 TF/TAP) as a result of changes in the affected facility designation. Except as otherwise indicated, reference is made in this comment summary to the composite standard for prebake plants (i.e., 2.0 lb TF/TAP) for convenience of discussion.

List of Commentators

Commentator Number	Commentator	Affiliation
S1	Souka	Airco Speer Carbon Graphite
S2	-	Not a comment
S3	Cooper	Alabama Air Pollution Control Commission
S4	Rountree	General Counsel of the Dept. of Commerce
S5	Hosmer	Monsanto Industrial Chemicals Company
S6	Schwegmann	Kaiser Aluminum and Chemical Corporation
S7	Ayres	Natural Resources Defense Council, Inc.
S8	Byrne	Martin Marietta Aluminum
S9	Hulcher	Reynolds Aluminum
S10	Boyer	Consolidated Aluminum Corporation
S11	Meier	Farmland Industries, Inc.
S12	Bolo	Ormet Corporation
S13	Armintrout	Eastalco Aluminum Company
S14	Colbert	Revere Copper and Brass, Inc.
S15	Simmons	State of California - Resources Agency - Air Resources Board
S16	Atkins	Aluminum Company of America
S17	Meyer	Virginia - State Air Pollution Control Board
S18	Hook	Anaconda Aluminum Company
S19	Byrne	Martin Marietta Aluminum
S20	Duprey	U. S. EPA (Division of Stationary Source Enforcement)
S21	Gaulding	Pennsylvania - Dept. of Environmental Resources

Public Comment Summary:
Primary Aluminum Industry

Number	Section	Commentator	Comment	Response
1	Preamble	S3	The preamble to the proposed regulation reads that costs of meeting these standards is considered reasonable for new sources, but that "it is not implied that the same costs apply to the retrofitting of existing sources." However, in a previous statement in the preamble, it is stated that states would be required to adopt performance standards for existing sources which would be as stringent as new source standards. The costs of compliance with new source standards by existing sources would be unreasonable, and no unrealistically stringent fluoride standards should be required for existing sources.	The preamble to the proposed regulations states that "final promulgation of this standard of performance for new sources will require that the States develop emission standards for existing primary aluminum plants." It does not say that the State standards for existing sources will be as stringent as new source standards. Existing source standards will take into account the cost of retrofitting an existing facility, and will not necessarily be as stringent as new source standards (see 40 FR 53339, "State Plans for the Control of Existing Facilities," November 17, 1975).
2	Preamble	S12	Contrary to what the preamble says there will be an adverse impact on the smaller aluminum producers. There are 12 American aluminum companies with the largest three representing approximately 70 percent of the total industry capacity. The remaining nine companies are indeed small business when compared with their competitors. It has not been demonstrated in the rule making process that the nine small primary aluminum producers will not be adversely affected by the proposed regulations as compared to the recognized giants of the industry. Such a regulation will lessen	The costs required by the standards in excess of the costs normally being incurred by the industry in the absence of the standards are not large enough to significantly affect competition among aluminum producers. Incremental costs to comply with the standards for a center-work prebake plant amount to approximately 0.1¢/lb aluminum Background Information for Standards of Performance: Primary Aluminum Industry Vol. 3, Section I). In light of the current aluminum prices in excess of 30¢/lb, the

Number	Section	Commentator	Comment	Response
			competition since small producers could not afford to build while large producers could.	above costs appear insignificant. As indicated in the economic section of the background document (Volumes 1 and 3), even total absorption of costs of this magnitude would not seriously affect a new aluminum plant in competition with existing plants that do not need to meet the new source standards, nor would it significantly deter construction of new center-work prebake plants even by small producers.
3	Background Document, Economic Section	S4	EPA's estimates evidence very substantial capital investment and annual operating costs for the proposed NSPS control. EPA does not analyze the effects of these costs on the industry; the availability of necessary capital; and the resulting competitive position of the domestic industry. EPA's own analysis of alternative courses of action to such required investment and operating costs indicates that the only feasible alternative is to "export" the industry by building all future aluminum reduction plants in foreign countries, or importing our future additional requirements of aluminum. Neither is acceptable. The costs of EPA's standards would freeze domestic capacity at the present level.	The probable economic effects of the control costs were discussed at some length in Volume 1 of the background document. One effect of the standard will be to accelerate the current trend toward increased use of the center-work prebake process. See Volume 1 of the background document and the response to comment 19. The costs attributable to the standards, when compared to the costs that are currently being spent in the industry to control fluoride emissions, will not be large enough to significantly deter the construction of new center-work prebake cells. The question of capital availability was considered in arriving at the

Number	Section	Commentator	Comment	Response
3 (Cont.)	Background Document, Economic Section	S4		above conclusion. The capital availability with which EPA is concerned is the incremental capital requirements resulting from the standards over and above what would normally be required for base aluminum plant construction and for control systems that would be installed in the absence of the standard. This incremental amount ($30/ton of capacity for the center-work prebake example) was not judged to be excessive in light of the fact that fluoride control capital now averages $50/ton and base plant capital requirements are on the order of $750-$1000/ton of capacity. The matter of "exportation" of the domestic primary aluminum industry was considered when evaluating the impact of the fluoride standards on the industry. As discussed in Volume 1 of the background document, EPA concluded that an incentive to "export" new capacity to Canada will not exist for a standard of 2.0 lb F/ton of aluminum, and that existing and new capacity will be sufficient to satisfy projected domestic demand.

Number	Section	Commentator	Comment	Response
4	Background Document, Vol. 1, p. 53	S6	The document indicates an installed cost of $8,500 for the Method 14 manifold. A more realistic estimate would be $25,000 per room, using stainless steel, including hardware, software, and installation.	Since the time the $8,500 estimate was made, construction costs have risen sharply, and it may be that in this instance installed costs for the manifold would be as high as $25,000. However, EPA has now approved the use of aluminum in the manifold which will substantially reduce the cost. In addition it may be possible to have the use of other construction materials approved as provided in §2.2.1 of Reference Method 14.
5	Background Document, Vol. 1, p. 14	S7	Aluminum smelters are very significant sources of carbon monoxide and sulfur dioxide emissions, yet EPA has failed to propose standards for these pollutants. While it is plain that fluorides are the most toxic emissions from aluminum smelters, the mandate of section 111 of the Clean Air Act is that all emissions of pollutants from new sources shall be controlled to the maximum feasible extent. Nothing in this section suggests that EPA is free to pick and choose among significant pollutants emitted from any given type of new source.	See the discussion of this issue in the preamble to the final regulations.

Number	Section	Commentator	Comment	Response
6	Background Document, Volume 1	S12	Page 33, Volume 1 of the document states that a primary control system can achieve levels of control of 0.5 lb F/ton of aluminum produced or less. Page 37 states that good capture efficiency can limit secondary control system emissions to 1.5 lb F/ton of aluminum. Page 95 states that fluoride emissions from carbon bake plants can be controlled to 0.10 lbs F/TAP. Simple addition of these levels reveals that EPA is really stating that an emission limitation of 2.1 lbs F/TAP or less can be achieved, and yet is proposing a 2.0 lbs F/TAP standard.	The statements referred to in the comment are general in nature as they summarize data from several different types of primary aluminum plants (vertical stud Soderberg, horizontal stud Soderberg, and prebake). The statements are not meant to show, by direct addition, how the standard for prebake plants evolved. As discussed in Volume 1 of the background document and elsewhere in this comment summary, the test data and other information indicate that the 2.0 lb F/TAP standard can be met by new centerwork prebake plants and by horizontal stud Soderberg plants without secondary controls. See, e.g., the responses to comments 8, 10, 16, and 20.
7	General	S4	No justification for choosing new source performance standards as the control strategy is given although there is reference to an internal "preferred standards path" analysis. Other information arguing for control of fluorides is applicable to and even appears to favor consideration of fluoride as a criteria type pollutant.	The rationale for choosing to control fluoride through standards of performance for new stationary sources is presented in the Preferred Standards Path Report for Fluorides, completed by the Agency in November, 1972. A copy of this report is available for inspection at the Public Information Reference Unit, Room 2922 (EPA Library), 401 M Street, S.W., Washington, D. C.

Number	Section	Commentator	Comment	Response
8	General	S6	The EPA data, on which the standards are based, demonstrate that "best technology" air pollution control systems have a probable compliance expectancy of only 90 percent, that is they will be out of compliance approximately 10 percent of the time. This imposes a statistical requirement for an average performance considerably less than 2 lb F/TAP. Also it would be nearly impossible to "tune up" for a compliance test since at one plant there are 96,720 bags in 496 baghouse modules, and the statistical probability of malfunction is very high even under optimum maintenance condition. The conclusion from this information is that since the standards are based on measurements which have a compliance probability of 90 percent, an appropriate statistical technique should be applied to the compliance testing procedure.	Under §111 of the Act, standards of performance are based on the best technology which has been "adequately demonstrated." "Adequately demonstrated" means that the Administrator must determine, on the basis of all information available to him (including but not limited to, tests and observations of existing plants and demonstration projects or pilot applications) and the exercise of sound engineering judgement, that the control technology relied upon in setting a standard of performance can be made available, and will be effective to enable sources to comply with such standards. In other words, test data for existing plants are not conclusive in determining what levels of control can be achieved through application of best demonstrated control technology and must be assessed in the light of other pertinent information. For example, atypically high emissions resulting from a malfunction or from other unrepresentative conditions must obviously be ignored or discounted (as they would be in performance testing under §60.8). Thus, high and low test results cannot simply be lumped together for purposes of a statistical analysis designed to show that the plants tested would be out of compliance with a given standard for a certain percentage of time. As discussed in Volume 1 of the background document, the range and variability of

Number	Section	Commentator	Comment	Response
8 (cont.)	General	S6		the test data for existing plants were assessed in the light of operating and test conditions, and greater weight was given to source test results than to others as a result of this analysis. It should also be noted that even the best-controlled existing plants in a given source category do not necessarily use best-demonstrated control technology, or follow optimum operating procedures (e.g., removal of fused cryolite from anode remnants), and they may not incorporate design improvements (e.g., segmented doors on hooding) that can yield further reductions in new plants. Finally, it should be noted that, in practical effect, the fluoride standard applies only during initial and subsequent performance testing (see response to comment 16). Thus, there is no need to apply statistical techniques to take into account "violations" of the standard that might occur at other times. Concerning the comment that it is nearly impossible to "tune up" for performance tests, proper maintenance and operation of an adequate control system are all that should be required to meet the fluoride standard. Some of the existing plant test data were gathered at plants using baghouses, and yet these plants demonstrated compliance

Number	Section	Commentator	Comment	Response
8 (cont.)	General	S6		with the standard. Using all the sources of information available, the Agency has concluded that the 2.0 lb F/TAP standard can be achieved at reasonable cost. See also the responses to comments 10, 16, and 20.

Number	Section	Commentator	Comment	Response
9	General	S11	Fluoride emissions are localized and do not affect the entire United States as do the other pollutants listed in section 108. Therefore, the establishment of new and existing source standards should be left to the discretion of the state or area in which they occur.	Fluoride emissions are localized. For that and other reasons, the analysis presented in EPA's "Preferred Standards Path Report for Fluorides" (see response to comment 7) concluded that a national ambient air quality standard would be inappropriate and that the performance standard path (section 111) was the appropriate control strategy. Reasons for controlling fluorides at the Federal level are summarized in the preface to Volume 1 of the background document.
10	General	S12	Present evolutions do vary with pot design and method of operations, therefore the standard should apply to the entire range of emissions. Otherwise the regulation may tend to restrict competition by unavoidably dictating use of a particular design.	As indicated in Volume 1 of the background document, the standard applies to and takes into account the entire range of emissions that would be expected at aluminum plants in the absence of control requirements (i.e., 40-60 lb F/TAP). One center-work prebake plant tested by EPA fed 61.4 lb F/TAP into the primary control system, yet emissions from the primary control system averaged only 0.49 lb F/TAP (D), and total emissions from the plant averaged only 1.66 lb F/TAP (well below the 2.0 lb F/TAP standard). From this and other data, EPA believes even plants with high fluoride evolution rates will be able to meet the standard. In general, EPA is authorized to promulgate one standard applicable to all processes used by a certain category of sources (in this instance one standard for the several prebake and Soderberg processes), in order that the

Number	Section	Commentator	Comment	Response
10 (Cont.)	General	S12		standard will reflect the best system of emission reduction for that category. Application of the standard will simply intensify an existing trend toward aluminum production by the center-work prebake process, as opposed to the sidework prebake and Soderberg processes. See Volume 1 of the background document and the response to comment 19.
11	General	S12	Present evidence indicates that, under the worst ambient fluoride concentrations found, there is no resulting damage to human health through inhalation. Therefore, the proposed standard is not justified on the basis of protecting human health. There is evidence that fluorides can harm certain animals. However, there is no justification for the standard on the basis that at the proposed level no damage will occur whereas at any levels above the standard injury will occur. The proper approach for standard setting would be to properly determine what emission level would not be exceeded with sound hooding and guaranteed primary scrubbing and then to determine if the cost of secondary scrubbers to achieve a low emission level (such as 2.0 lb F/TON) is justified on the basis of reduced economic damage.	Under section 111 of the Act, Standards of Performance are to be based on application of best demonstrated control technology (considering costs), rather than on emission levels tied directly to protection of public health or welfare. Secondary controls will be unnecessary for center-work prebake plants and horizontal stud Soderberg plants. See response to comment 12.
12	General	S12	The 2.0 lbs F/ton of aluminum produced standard, if promulgated, would require tremendous energy consumption since secondary control systems would have to be installed to achieve continuous compliance.	The standard can be met at center-work prebake and horizontal stud Soderberg plants on a continuous basis by application of good primary control systems to the source; no secondary system should be required. At vertical stud

Number	Section	Commentator	Comment	Response
12 (cont.)	General	S12		Soderberg and side-work prebake plants secondary control systems would probably be required, but there is a trend away from use of these processes for other reasons. See Volume 1 of the background document and the response to comment 19.
13	60.190	S9	The definition of affected facility does not appear to be consistent with the information on pp. 20-21 of Volume 1 of the background document. It seems more appropriate to adhere to the definition from the background document.	See the response to comment 14.
14	60.190	S13, S12, S19	The present wording of the proposed standards, which considers the affected facility to include all potrooms and anode bake plants on contiguous properties, when combined with the wording included in the proposed clarification (39 FR 36946), will result in potentially unjustified restrictions on plant expansions. As we understand the clarification on modifications, if an additional new potline is to be constructed at an existing facility, it will be necessary for the entire facility to meet new source performance standards. If the existing facility is already attaining the emission levels required by the existing source performance standards, we feel that the requirement to retrofit it to new source performance levels will result in a curb on expansion. We propose that the affected facility be considered each potroom and anode bake plant phase, or define the physical or operational changes at existing	As discussed in the preamble to the final regulations, §60.190 has been revised to limit the applicability of the standards in situations involving expansion of existing sources.

Number	Section	Commentator	Comment	Response
14 (cont.)	60.190	S13, S12, S19	sources which would constitute modifications.	
15	60.190	S14	Concerning modification, we believe it is not EPA's intent to subject entire existing primary aluminum plants to NSPS simply because one or more new potlines are added to an existing plant. It is suggested that the wording of §60.190 be revised so that no confusion will result from the definition of affected facility in circumstances where additional potlines and associated anode bake facilities are constructed at existing primary aluminum reduction plants.	See the response to comment 14.
16	60.192	S9, S13, S3	The 2 lb/TAP standard should be stated as a long term average because of normal statistical variations inherent in process operation, sampling, and analytical technique. Through EPA's data, it can be shown that plants must operate well below 2 lb/TAP to be assured of meeting the standard at any time.	The test data on which the standard is based included normal variations resulting from process operations and similar factors but show that the standard can be met. See the response to comment 8. In addition, it should be noted that the standard does not really apply at all times. Under §60.11(a), compliance with the standard is determined only by performance testing. In practical effect, this means that the fluoride standard (as opposed to the opacity standards and the proper maintenance and operation requirement) applies only during initial and subsequent performance testing. Finally, EPA believes that various provisions applicable to performance testing (summarized in the response to comment 23), as well as the level of the standard itself, provide

Number	Section	Commentator	Comment	Response
16 (cont.)	60.192	S9, S13, S3		sufficient protection against a source being found in violation as a result of normal variations in emissions.
17	60.192	S7	Recently, the Alcoa Corporation had announced its intention to build, on a very large commercial scale, an aluminum smelter using a newly developed process that emits significantly less fluoride, while also consuming up to 30 percent less energy. According to Alcoa, this process has been in development for many years, and is the result of a research and development expenditure of some $25 million. In light of this information, it would appear that EPA may now have a chance to stimulate the adoption of the Alcoa process at other new or planned facilities. It seems incumbent upon EPA to conduct a substantial investigation to determine whether the Alcoa process can be generally applied, before promulgating the proposed standards.	The newly developed Alcoa Smelting Process for primary aluminum production will be used at a relatively small pilot plant in the near future. Present construction plans call for completion of a 30,000 ton/year facility by 1976 with actual production beginning in the first quarter of 1976. If the new process proves successful, the pilot plant is expected to be expanded to full design capacity by the early 1980's. This new process has not been proven commercially viable at this time, although indications are that it may be in the near future. At such time, the Agency will reevaluate standards of performance for the primary aluminum industry in light of the new technology.
18	60.192	S7	The proposed new source standards are considerably too lenient, and do not represent the application of the best system of emission reduction. The proposed standard is considerably less stringent than that required under the State of Oregon's regulations concerning conventional aluminum smelting operations, and their technical conclusions should be given great weight.	See the discussion of this issue in the preamble to the final regulations.

Number	Section	Commentator	Comment	Response
19	60.192	S10, S14	The proposed 1 kg of fluoride per metric ton of aluminum produced is not achievable with the side work prebake pot design. We are convinced that even with the best available technology, regardless of cost, the proposed limitation cannot be met.	The 2.0 lb TF/TAP standard is based in part on emission data from center-work prebake plants utilizing dry scrubbing of emissions collected by hoods over the aluminum reduction cells. In the background document, the data supporting the standard do not include emission test results from side-work prebake plants. The "prebake" data in the document are exclusively from center-work plants, because the best controlled prebake plants are of the center-work type. EPA has reviewed available data from existing side-work plants and has contacted the industry to determine whether side-work plants could possibly meet the standard. The most recent information indicates that the best primary hooding efficiencies for side-work plants are on the order of 85-90 percent, whereas a 95 percent hooding efficiency would be required to meet the standard with a primary control system alone. EPA has concluded that a new side-work plant could meet the standard but would probably have to install a secondary control system to do so. Although EPA's economic analysis indicates that this is not an economically feasible alternative, there are side-work plants in the U. S. operating with both primary and secondary emissions controlled. This shows that a general economic analysis does not apply to every situation in a particular industry.

Number	Section	Commentator	Comment	Response
19 (cont.)	60.192	S10, S14		Special cases will develop where unusual economic conditions exist and options that do not appear feasible under the general economic analysis are feasible in the special case. Assuming that a new side-work plant would not be able to meet the standard using a primary system alone and that it would not be economically feasible to install secondary scrubbing, EPA investigated the probability of new capacity being in the form of center-work prebake plants. The center-work prebake cell enjoys inherent advantages relative to other cell types in ability to mechanize the reduction process and in ease of controlling air pollution. It is possible to computerize mechanical functions such as alumina addition and crust breaking which reduces manpower requirements. This cannot be done at side-work prebake plants. Also, center-work cells can be operated with an energy efficiency equal to that of side-work cells. For these reasons, there is a trend in the industry today toward use of center-work prebake cells. There are two existing plants in the U.S. which currently operate both Soderberg and center-work cells. Also, a representative from a company that operates side-work cells stated that if the company expands, center-work cells would probably be installed because of their advantages. It appears that there are no major obstacles to building center-work cells at companies currently

Number	Section	Commentator	Comment	Response
19 (cont.)	60.192	S10, S14		utilizing other types of cells. In summary, promulgation of the 2.0 lb TF/TAP standard will hasten the existing trend in the industry toward the use of center-work prebake cells. However, the Agency believes promulgation of the standard will not restrict expansion within the industry.

Number	Section	Commentator	Comment	Response
20	60.192	S12	The standard that should be proposed must be based on 95 percent hooding and 99 percent primary control system efficiency. Using Singmaster and Breyer, Air Pollution Control in the Primary Aluminum Industry, industry weighted average of 45 lbs F/TAP uncontrolled potline evolution, an average potroom emission of 2.8 lbs F/TAP could be achieved. It must be stressed that the above is an average emission over the entire pot operating cycle based on an industry average rate of evolution. For EPA to promulgate a standard requiring compliance on the basis of an eight hour test in the potrooms, a standard much higher than 2.8 lbs F/TAP would be required. If EPA's statement that pot evolutions range from 40-60 lbs F/TAP is valid, then the standard should be based on 60 lbs F/TAP pot evolutions. The standard then should be 3.7 lbs F/TAP.	Primary hooding efficiencies for new center-work prebake plants have been estimated at 95-97% and primary control system efficiencies of 99.5% have been demonstrated (see pp.23-24 of Volume 1 of the background document). The estimated hooding efficiencies take into account improvements (discussed in Volume 1 of the background document) that can be made in design and maintenance of cell hooding at new plants (for example: segmented doors on hooding and better drafting of cells to reduce emissions when doors are open). These efficiencies meet the standard even for plantsproducing uncontrolled cell emissions of 60 lb TF/ton of aluminum.
21	60.192	S12	The proposed level of fluoride control is questioned for several reasons. A review of the background information shows that some of the best controlled plants were periodically out of compliance. It should be further noted that few tests periods in EPA's data were as short as those allowed by the proposed standards. It is a well known fact that long tests tend to average periods of high and low emissions. Also the proposed standard is "Based on an assumed fluoride control efficiency of only 90 percent...(on emissions from carbon bake plants." Test data presented from the best controlled plants which EPA could find showed controlled emissions some 4 to 6 times the emissions assumed to be possible by EPA. Only a limited number of tests were run on any facility used to allegedly demonstrate ability	See the responses to comments 8,16,23, 33,38, and 39. Concerning the test data on carbon anode bake plants, the Agency could not locate any bake plants specifically controlled for fluoride removal. Thus, the data obtained from two plants indicates emissions on the order of 0.6 lb TF/TAP. As discussed in Volume 1 of the background document, however, EPA believes that using scrubber technology demonstrated in other industries, bake plant operators should easily be able to reduce emissions to less than 0.1 lb TF/TAP. Disagree. See the responses to comments 8 and 16.

Number	Section	Commentator	Comment	Response
21 (cont.)	60.192	S12	to meet the proposed standard. Application of standard statistical methods to the test data reveals the conditions which would likely have been found if further testing had been carried out. From such analysis and use of the assumed anode plant emissions it is shown that plants A, B, C, and D are out of compliance 25, 70, 0.1 and 30 percent of the time respectively. Since plants C and D are both center-work prebakes and since both plants utilize the same control technology, it seems realistic to statistically analyze the total of the data from the two plants. The analysis reveals that center work prebake plants would be out of compliance with the proposed standard approximately 15 percent of the time.	
			To meet the proposed standard an overall control efficiency of 95-97 percent would be required in the potrooms. This means hooding efficiency of 97 percent of the fluorides. It is completely unrealistic to expect such efficiencies to be maintained on a continuous basis.	Disagree. See the responses to comments 8 and 20.
22	60.192	S14	Vendors of dry scrubbing systems do not generally guarantee efficiencies greater than about 98.5 percent on total fluorides. Primary hooding efficiencies for center-work prebake plants which would be necessary to meet the proposed standard have not been demonstrated on a long term continuous basis. Using EPA data and assuming normal statistical variation in process operation, a center-work prebake plant utilizing best available control technology would exceed the 2 lb F/ton standard a large percentage of the time. Using primary collection efficiencies of 95 percent and primary recovery efficiencies of 98.5 percent, a 3 lbs F/ton standard is recommended.	Disagree. See the response to comments 8, 10, 16 and 20. Under §111, standards of performance are to be based on application of best demonstrated control technology (considering costs). Vendor guarantees, like test data for existing plants, are probative but not conclusive in determining the levels of control that can be achieved with such technology.

Number	Section	Commentator	Comment	Response
23	60.192	S16	The proposed limitation is unduly restrictive. The best available technology that can be utilized for the type of Hall cells that Alcoa may build in the future(center-work prebake) can be relied upon to provide a maximum of 96.5 percent hooding efficiency and 99+ percent treatment efficiency. Recent advances have made it possible for Alcoa to achieve current efficiencies in excess of 91 percent, instead of the 83 to 88 percent efficiencies of the 60's and early 70's. The increased efficiencies, greater production, and greater fluoride evolution results after only minor modifications. These cells then emit about 60 lbs F/ton aluminum. Applying 96.5 percent hooding efficiencies and 99 percent treatment efficiency to this evolution rate results in a calculated emission level of 2.66 lbs F/ton. Thus, the proposed 2.0 lbs F/ton aluminum limitation would have the effect of requiring Alcoa to limit its operation philosophy to the lower density (lower current efficiency) type production. A standard of 3.0 lbs F/ton would be reasonable for new plants designed to operate at high current efficiencies if: 1) It is made clear to State compliance testers that the compliance tests must be conducted under normal operating conditions. 2) The statistical variations expected under normal operating conditions are discussed to discourage State agencies from attempting to use one-shot compliance	As discussed in Volume 1 of the background document (p. 9), the Agency realizes that aluminum plants may emit as much as 60 lb TF/ton if uncontrolled. To meet the standard for this emission rate would require an overall control efficiency of approximately 97%. The Agency believes that this efficiency can be achieved at new center-work prebake and HSS plants. See the responses to comments 8, 10 and 20. Section 60.8(c) provides that performance tests must be conducted under representative conditions and makes clear that operations during periods of startup, shutdown, or malfunction shall not be considered representative conditions (unless otherwise specified, which is not the case here). Section 60.8(f) provides that each performance test shall consist of three separate runs. Section 60.195(b) provides that the sampling time for each run shall be at least 8 hours for potroom emissions from stacks, and §5.3.4 of Method 14 provides for sampling times of up to 24 hours for the more variable emissions from roof monitors. EPA believes these provisions, as well as the level of the fluoride standard itself (which takes into account normal variations likely to occur), provide sufficient protection against a source being found in violation as a result of

Number	Section	Commentator	Comment	Response
23 (cont.)	60.192	S16	testing as a method of enforcement. A new source standard of 2.0 lbs/ton is not achievable at the present time. The testing done by EPA on retrofit plants was limited to samples on three types of plants. The data obtained is fragmentary and cannot be compared to data for each plant developed previous to testing. For example, eight samples taken on a vertical Soderberg plant which indicated that 2.0 lbs F/ton was achievable. During the same year that the EPA tests were conducted, the plant had a yearly average of close to 3.0 lbs F/ton according to reports made to the state involved. The Alcoa 398 system is cited as being capable of achieving a 2.0 lbs F/ton standard. The achievement of that level by a plant utilizing the 398 system is still dependent on the hooding capability, availability of the proper type of alumina, and the bags for the large number of baghouses. Experience has indicated that as a plant becomes older, it becomes increasingly difficult to maintain equipment due to the aging of cells. The proposed standard is based on the limited testing of a relatively new plant equipped with a 398-system. Testing of this same plant at this time should indicate that a 2.0 lbs F/ton is not achievable. It is suggested that a 3.0 lbs F/ton aluminum is more realistic standard.	unrepresentative test conditions or normal variations in emissions. As discussed in Volume 1 of the background document and elsewhere in this comment summary, the test data show that the standard can be met without secondary controls at new HSS and center-work prebake plants. EPA has already indicated that new VSS plants (if any are built) may need secondary controls. Concerning the aging of cells, the commentator has provided no data to support his contention. In addition, EPA has been unable to quantify the possible effects of aging on fluoride emissions. As indicated in the background document, EPA's test data were obtained from existing plants, and most of the cells involved were not new. At present, EPA believes it is possible to meet the standard using good maintenance practices on the hooding and control systems as they age. EPA invites the submission of any additional information on this subject.

Number	Section	Commentator	Comment	Response
25	60.193	S12	In the background document it is stated that if fluorides are well controlled. the resulting control of particulates and organics will be good. This clearly indicates that additional opacity limits are not necessary.	Opacity limits provide an effective and easily utilized means of determining whether or not control equipment is being properly maintained and operated. For this reason, EPA believes the opacity standards are both necessary and desirable and has retained them in the regulations. EPA's general policy on the use of opacity standards is discussed in a notice published in the Federal Register on March 8, 1974 (39 FR 9308), and the use of opacity standards under §111 has been upheld by the Court of Appeals for the District of Columbia Circuit in Portland Cement Ass'n. v. Train, 513 F. 2d 506, 508-09 (D. C. Cir. 1975).
26	60.193	S12	An opacity standard should not be promulgated since good control of fluoride emissions will provide good control of particulates. An opacity limitation would only add confusion rather than effective control.	See the response to comment number 25.
27	60.193	S16	Since much of the particulate matter exhausted by anode baking furnace stacks is in the form of small particles of low density and high refractivity, visible plumes can result even when mass emissions are low. Alcoa has determined that through careful furnace wall maintenance and controlled firing practices, it is possible to comply with realistic mass emission standards based on process weight and maintain plume opacity below 30 percent. It is therefore suggested that the opacity limitation be 30 percent.	The visible emission data collected by the Agency show that a 20% opacity standard can be met at a well-controlled anode bake plant (see pp. 41-45 of Volume 2 of Background Information for Standards of Performance. Primary Aluminum Industry. In the unlikely event that an affected facility meets a mass emission or concentration standard but cannot meet the associated visible emission standard, it is possible to have a separate visible emission standard established for that facility according to §60.11(e) of the regulations, as promulgated on November 12, 1974 (39 FR 39872).

Number	Section	Commentator	Comment	Response
28	60.194	S16	Alcoa currently weighs all aluminum produced on a line-by-line basis and determines by statistically valid means the average weight of anodes produced. In addition, the alumina feed is metered but is not weighed to determine individual pot inputs. Alcoa also monitors pot hours of operation on a line-by-line basis. Our operating people feel that these measurements are adequate to provide information on aluminum production rates and anode consumption rates acceptable to them and to EPA. Perhaps a mechanism for gaining approval of the company monitoring method could be established in §60.194 rather than listing a set of rigid requirements.	It is possible to have the use of alternative or equivalent methods of measuring aluminum production and anode consumption approved by the Administrator under 40 CFR 60.8(b), as revised on March 8, 1974 (39 FR 9308).
29	60.195	S12	There is no provision in the proposed regulations to prohibit a sample from being taken during a carbon anode changing shift. The anode changing results in a greater evolution of fluorides, and there is no indication in the background document that the proposed standard can be met at these times.	The eight hour (or longer up to 24 hours) sampling period for secondary emissions should be adequate to average out momentary increases in fluoride evolution during carbon anode changing. The test sampling on which the standard is based included carbon anode changes.
30	60.195	S12	The requirement for determing daily anode production with scales having an accuracy of +5 percent is unjustified and unrealistic. Daily production records over long periods of time accurately establish typical daily production and should suffice for determining compliance.	See the response to comment 28.
31	60.195	S16	Experience with fluidized bed dry scrubbers indicates that the emission rate is rela-	Four-hour sampling of the fluidized bed dry scrubber may not provide enough

Number	Section	Commentator	Comment	Response
31 (cont.)	60.195	S16	tively constant throughout the day and not influenced greatly by potroom activity. Therefore, a four-hour sampling of the fluidized bed dry scrubber will provide adequate information on emission rates. 24-Hour sampling rates should be required on the roof monitors since the emissions from these sources are highly influenced by potroom activities.	fluoride in the sample to be analyzed by Reference Method 13A or 13B. An eight-hour sample should provide a measurable quantity of fluoride. Concerning 24-hour sampling rates for secondary emissions, Reference Method 14 provides that if there is reason to suspect that an eight-hour sample will not be representative, then a longer sampling period, up to 24 hours, may be used.
32	60.195	S20	There is no sampling time specified for roof monitors.	The sampling time for roof monitors is specified in §5.3.4 of Reference Method 14.
33	60.195(b)	S12	Revise §60.195 as follows: "Sampling time for each run shall be over the entire pot operating cycle for a sample from the potroom or testing representative of an operating cycle."	Since emissions from primary control systems are less variable than the emissions from roof monitors, there is no need to sample primary control devices over an entire pot cycle in order to obtain a representative sample. The Agency has determined that the 8-hour sampling time specified will produce adequate test results. However, longer sampling times are permitted by §60.195(b), and a sampling time of up to 24 hours is permitted (§5.3.4 of Reference Method 14) for sampling the more variable emissions from roof monitors. See also the response to comment 29.

Number	Section	Commentator	Comment	Response
34	60.195(d)	S9	Although the intent in §60.195(d) is to measure the production from the cells which are causing the emission, the procedure does not necessarily accomplish this. Cells in more than one potroom may be connected to a primary control device. A better procedure would be to calculate a daily average based on the previous 30 day's production records.	See the response to comment number 28.
35	60.195(d)	S8	The 8-hour period prescribed for the determination of emissions would not necessarily provide a meaningful measure of aluminum production. At one plant on any given shift, one-half of one-third of the pots in a building are tapped. Therefore, all cells would be tapped in six shifts or 48 hours. The aluminum produced in the room sampled during that month in which the sample was taken, would provide an adequate base upon which to calculate the rate of emissions.	See the response to comment number 28.
36	60.195(d)	S14	The quantity of metal tapped from a cell, or a group of cells constituting a potline or plant, varies widely from shift-to-shift and day-to-day. It is suggested that the rate of aluminum produced during a sampling period be calculated based on the average hourly weight as determined from the previous 60-90 day's production records.	See the response to comment number 28.
37	60.195(f)	S20	Delete "or Method 14" from "Q_s = Volumetric flow rate of the effluent gas stream in dscm/hr as determined by Method 2 or Method 14."	Disagree. The statement is correct as printed. Method 2 will be used when determining effluent flow rate from the primary control system, and Method 14 will be used when determining flow rate of secondary emissions from the roof manifold.

Number	Section	Commentator	Comment	Response
38	Background Information	S13	Testing equipment and sampling methodology used by the EPA frequently varied from the proposed Methods 13 and 14, making it difficult to determine what the equivalent results would have been if those methods had been utilized. For Method 13, not one test was conducted for the prescribed 8-hour sampling period.	As is stated in the background document, sampling times were varied during testing to determine the effect of such variations on the test results. In many of the tests, sampling runs in excess of eight hours were made. After the test program was completed, the eight-hour sampling time was selected because the Agency concluded it would provide representative samples for future performance tests. The sampling train used in the aluminum plant testing is essentially a slightly modified Reference Method 5 sampling train and is identical to the train specified in Reference Methods 13A and 13B (40 FR 33151, published August 6, 1975). See also the response to comment 39.
39	Background Documents	S13	Due to the limited number of tests and the deviations from the proposed Methods 13 and 14, the data are not amenable to meaningful statistical analysis of variance. The results of the tests show considerable variability because of variations in a number of testing parameters. How can EPA place any confidence in the reported results?	The number of plants tested in the development of standards of performance under §111 is often small because the number of well-controlled existing plants in a given source category is often small. At the time of data gathering for the aluminum standard, methods for determining fluoride emissions from primary aluminum plants were under development. Of course, when developing new test methods, variations in technique are to be expected and are even desirable because the best single method is being sought. The most significant variability in the test data occurred in the case of secondary emissions from VSS plants, and EPA has already indicated that VSS plants

Number	Section	Commentator	Comment	Response
39 (cont.)	Background Documents	S13		(if any are built) may have to install secondary control systems to meet the standard. As discussed in Volume 1 of the background document, the Agency took into account the range and variability of the test data when considering the level of the standard. Additionally, some testing was done using the multi-point sampling technique of Method 14 and as is stated in the background document, these test results were weighed heavily in the development of the standard. See also the responses to comments 8, 16 23 and 39.
40	General	S13	The Agency has indicated that concern over the variability of test results is unwarranted since advance notice will be given before all compliance tests. However, the test results obtained by the EPA contractors were presumably acquired from tests performed after advance notice and under generally favorably conditions. Nonetheless, considerably variation did occur. Consequently the variability in the Agency's own data was apparently of a type which would not be controlled or eliminated by the source operator. If this is the case, advance notice will have little impact on test results.	Considering the possible variation of the test data, the Agency believes the 2.0 lb TF/TAP standard can be met for a single performance test consisting of three sampling runs. See also the responses to comments 8, 16, 23 and 38.
41	General	S13	EPA has indicated that its technical staff interprets 60.2(q) and 60.8(c) of the regulations in a manner which would make the proposed standard inapplicable to long-term upset conditions. However, the reference to a "sudden" failure in the "malfunction"	40 CFR 60.8(c), when read together with 40 CFR 60.11(a), in effect provides an exemption during periods of malfunction. As is clear from the definition of "malfunction" in 40 CFR 60.2(q), however, the exemption is intended to apply only to

Number	Section	Commentator	Comment	Response
41 (cont.)	General	S13	definition might not be interpreted as having application to a condition which arises in degrees and persists for an extended period (such as those resulting from use of sub-standard raw materials). EPA should expressly provide that the proposed standard does not apply to emissions as a result of upset conditions.	situations involving unavoidable excess emissions; it does not apply to "preventable" upset conditions or equipment breakdown. Use of substandard raw materials over a period of time is within the control of the source owner or operator and, in the absence of other factors beyond the control of the owner or operator, upset conditions resulting from such use would not be considered malfunctions. Although there may conceivably be situations in which "long-term" upset conditions would be unavoidable, the information presented by the commentator is insufficient to warrant any blanket exemption. The Agency invites any interested party to submit additional information on the frequency and duration of such upsets, measures which can be taken to avoid the upset conditions or to minimize emissions upon occurrence, and other relevant data. If such information indicates a need for an exemption, EPA will propose an amendment to the regulations.
42	General	S18	Experience has shown that in order to provide the assurance that the data obtained from sampling a secondary system is representative of any given plant the sampling must be carried out over a twenty-four hour period. It follows that several samples must be carried out over an extended period of time. Data acquired over a twelve month period illustrates several conditions that occur in the plant and the resultant effect	Reference Method 14 provides that if there is reason to suspect that an eight-hour sampling period would not be representative, then a longer sampling period, up to 24 hours, may be used. Concerning seasonal variations in emissions, the commentator has presented no data to support his contention. EPA realizes that emissions vary from pro-

Number	Section	Commentator	Comment	Response
42 (cont.)	General	S18	on emissions. One such effect is the noticeable difference in emissions from season to season.	cess to process within the industry, and that they vary within the process itself. As stated in the background document, uncontrolled emissions range from 40-60 lb TF/TAP, and an aluminum plant operator must have his control system designed to meet the 2.0 lb standard whether his process emits 40 lbs. or 60 lbs. of fluorides per ton of aluminum produced. See the response to comment number 20.

PRIMARY ALUMINUM INDUSTRY:
Comments and Responses for Reference Method 14

Number	Section	Commentator	Comment	Response
1	General	S6, S9	There should be a provision for allowing use of a method equivalent to Method 14.	It is possible to have the use of an equivalent method approved by the Administrator under 40 CFR 60.8(b), as revised on March 8, 1974 (39 FR 9308).
2	General	S9	An allowance should be made for that portion of the roof monitor emissions which is recirculated fluoride caused by the downwash and which re-enters the potroom through the ventilation system and again exits through the roof monitor.	It would be nearly impossible to quantify the fluoride emissions which are recirculated due to downwash. Such a phenomenon would probably produce negligible fluoride input back into the control system anyway. The Agency believes this situation will not cause any significant problems regarding compliance with the standard.
3	General	S13, S18	This sampling method is not applicable to plants with roof mounted secondary scrubbers since the monitor is entirely sealed with the exception of the scrubber exhausts. Because of the low profile and large length and width of the exhausts, it is impractical to sample the specified number of duct diameters down and upstream.	Reference Method 14 is not designed to be used at plants utilizing secondary scrubbing. The new source performance standard can be met with primary control (except for VSS plants which are not expected to be built anyway). Therefore new primary aluminum plants are not expected to use secondary scrubbers. In the event that a new plant is constructed with secondary controls, then an alternate test apparatus or procedure would have to be approved under 40 CFR 60.8(b). See response number 1.

PRIMARY ALUMINUM INDUSTRY:
Comments and Responses for Reference Method 14

Number	Section	Commentator	Comment	Response
4	2.1.1	S3, S9	Permanent anemometers need not be installed but an easily-calibrated, accurate anemometer properly located during an emissions test would suffice. This anemometer could be placed in the monitor by a simple pulley system.	See the response to comment number 1.
5	2.1.1	S18	The use of four anemometers in the roof monitors of each potroom is unnecessary when the design of the rooms and operation of the cells are identical. Four anemometer results would be representative of all.	See the response to comment number 1.
6	2.1.1	S9	Reference to sampling manifold section 5.2.1 should be section 2.2.1.	Agree. This correction has been made.
7	2.1.1	S12	Provide for the location of one anemometer at or near the midpoint of the monitor over each group of pots. A potroom which has a center aisle about midway down the length of the room, dividing the pots into two groups, would require two anemometers, one at or near the midpoint of each half. Delete the 85 meter requirements.	See the response to comment number 1.
8	2.1.1	S16	The need for numerous anemometers in a room is questioned. The concentration of pollutants in the exhaust will vary (high gas volumes should be dilute and lower gas volumes should be more concentrated), therefore, only the gases exhausted through the monitor in the area of the manifold system should be used to (cont'd)	The gas flow rates out of the roof monitor vary during normal pot room operations. Therefore, it is necessary to have several anemometers installed along the roof monitor in order to obtain a good estimate of the volumetric flow during a sampling period. The

PRIMARY ALUMINUM INDUSTRY:
Comments and Responses for Reference Method 14

Number	Section	Commentator	Comment	Response
			calculate emissions. In this way, the concentrations determined by the manifold system and the volumes exhausting the monitor in the area of the manifold will be multiplied together to determine mass emissions. If anemometers in other parts of the potrooms are utilized to determine exhaust volumes, those volumes might not correlate directly to the concentration measured in the manifold system. Therefore, Method 14 should require one anemometer be located within 10 meters of the end of the manifold system.	fluoride concentration also varies, but the Agency's information indicates that the concentrations average out to be approximately the same along the monitor length over the 8-hour sampling time.
9	2.1.1	S16	The anemometer support should be constructed so that the entire manifold system can be lowered for maintenance.	See the response to comment number 1.
10	2.2.1	S3	Mild steels have been shown to hold up very well under exposure to gaseous fluorides over long periods of time. Evidence of this is shown by the fact that cell superstructures are constructed of mild steel, and have been reported to last through more than 30 years of continuous use. Therefore, the use of stainless steel over mild steel is not justified considering the greater cost and questionable advantages of stainless steel.	In response to other comments, the use of aluminum in the sampling manifold has been approved and the appropriate changes to the reference method have been made. However, the Agency has no data regarding the use of mild steels. It may be possible to have the use of other materials approved under 40 CFR 60.8(b). See the response to comment number 1.
11	2.2.1	S6, S8, S18, S16, S14, S12	The requirement for use of 316 stainless steel is unsupported by test or logic. There is no reason to believe that aluminum or plastics would not be equally conditioned by 24-hour operation prior to sampling.	See the response to comment number 10.

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Number	Section	Commentator	Comment	Response
12	2.2.1	S9	The requirement that the monitor be made of stainless steel is unnecessary and imposes an unjustifiable cost burden. A simpler dry collection system is more desirable. This system uses a critical orifice to control sampling rate and requires no manpower during the sampling period.	Alternate sampling systems may be approved under 40 CFR 60.8(b). See the response to comment number 1.
13	2.2.1	S12	The manifold to be used in conjunction with Method 14 to measure potline roof losses should only be required in one quarter of each potline. It should be acceptable and reasonable to visually compare hooding utilization in the remaining three quarters with that being sampled in the fourth quarter.	See the response to comment number 1.
14	2.2.1	S16	The installation of one manifold monitor per pot type is adequate if the same operating parameters are utilized throughout a reduction plant and if identical fume collection and treatment equipment is used.	If only one manifold were installed, it would be impossible to compliance test other potrooms without manifolds. Yet it is possible for a potroom without a manifold to be out of compliance. Therefore, all potrooms are required to have manifolds.
15	2.3	S16	Experience has shown that the monitor exhaust gas temperatures are approximately 15 to 20 ^{0}F above ambient. The consistent nature of this temperature differential makes it appear unnecessary to install and maintain temperature monitoring devices.	The readings from the temperature sensors will be used to calculate the flow rate through the roof monitor. Estimates of monitor exhaust temperatures are not accurate enough for this calculation.

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Number	Section	Commentator	Comment	Response
16	4.2	S16	It is not necessary to recalibrate each nozzle in the manifold system on an annual basis. Such minor refinements will have little or no effect on the accuracy of the sample results.	The Agency has limited information on the need for recalibration of the nozzles. Recalibration is recommended but not required.
17	5.3.1	S1	The exit velocity of the gases leaving the monitor may vary over a wide range (100-1000 ft/min). Therefore, the choice of a conditioning velocity of 75 M/min. may not be the best choice.	Agree. This section of the method has been reworded.
18	5.3.1	S1	The connection between the sampling nozzle and point of sample collection should be as short as possible to minimize the effect of particulate settling in the duct. To achieve this, use high volume samplers placed near the monitor.	See the response to comment number 1.
19	5.3.2	S1	Determination of isokinetic velocity using a 24-hour average velocity determined prior to start of test is meaningless since monitor exit velocity is highly dependent on wind speed.	Unless there is a radical change in the weather conditions between the 24-hour average velocity determination and the actual sampling period, the 24-hour average velocity will give good results.
20	6.1	S1	§6.1 states that the velocity must not deviate by more than ± 10% during the sampling day. Based on commentator's testing, one-half of the samples were collected under conditions which would not satisfy this criteria since the average monitor exit velocities during a given test day varied by more than (cont'd)	Agree. Section 6.1 has been revised to allow velocity deviations up to ± 20 percent of isokinetic. This should eliminate most of the test rejections due to failure to meet the ± 10 percent criteria.

PRIMARY ALUMINUM INDUSTRY :
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Number	Section	Commentator	Comment	Response
			10% from the average of the previous day. Furthermore the velocity along the monitor at any one instant may vary considerably. Also, velocities at a given point may vary considerably from one moment to the other. Therefore, attainment of the criteria "Isokinetic sampling test," is not truly isokinetic sampling.	
21	6.1	S1, S9	Isokinetic sampling is not necessary and should be eliminated.	§6.1 has been revised to require sampling within ±20% of isokinetic. Isokinetic sampling (within 20%) is required because some large particles are expected to be present in the exhaust gases, and accurate sampling of these particles will be best accomplished by approximating isokinetic conditions at the probe.
22	6.1	S9	There is no need to make isokinetic sampling rate tolerance ± 10% of the roof monitor exit velocity during the previous 24 hours. The 24-hour average exit velocities from roof monitors at one plant range from 238 to 390 fpm and the instantaneous values will vary over a much greater range. This makes it impossible to maintain instantaneous isokinetic sampling rates even if 8-hour averages are perfectly matched. The discussion on page 17 of volume 1 of the background document states that when sampling roof monitors to obtain information used for the data base of the proposed standard, ". . . isokinetic sampling was compromised to maximize the collection (cont'd)	The requirement has been relaxed to ± 20 percent of isokinetic to eliminate test rejections due to failure to meet the rather stringent ± 10 percent criteria previously proposed. Isokinetic sampling was compromised during testing because the Agency had no manifold system at the time with which to conduct isokinetic sampling. However, the Agency believes Reference Method 14 will give the best results for future performance tests. See the response to comment number 21.

Number	Section	Commentator	Comment	Response
			efficiency of the pollutant (fluoride) in the impinger section of the EPA train." In justifying the EPA approach of using only single-point sampling in the roof monitor, the document further states, "This singlepoint method is not unreasonable since about 70% of the particulates are below 5 microns in diameter and behave almost like a gas." We agree with this EPA approach of anisokinetic sampling of secondary emissions and the work of Watson[1] shows that isokinetic sampling is not necessary for these small particles. Since EPA does not think isokinetic sampling is necessary for collecting the emission data for standard setting, then isokinetic sampling should not be necessary for determining compliance with that standard.	
23	6.1	S8	There is an apparent misconception on the part of EPA that Method 14 will provide "isokinetic" samples from roof monitors. Observations of flow rates through potroom roof monitors over several hundreds of hours indicates the practical inability of obtaining isokinetic samples. In addition, a consideration of the very low kinetic energies (inertia) imparted to the very small particles involved would strongly indicate that isokinetic sampling under these conditions is unnecessary. (cont'd)	Method 14 provides for sampling within + 20 percent of isokinetic conditions. See the responses to comments 1 and 21.

[1] W. Watson, American Industrial Hygiene Assoc. Quarterly 15, p. 21 (1954).

PRIMARY ALUMINUM INDUSTRY:
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Number	Section	Commentator	Comment	Response
			Method 14 will undoubtedly provide as good an answer as can be gotten (isokinetics or no) but there are other methods that will provide answers equally as good. Industry should not be restricted to this method. A suggested equivalent method would be the use of dry impregnated tape samplers located at representative points within the monitor.	
24	6.1	S18	While a satisfactory sample may be obtained by use of the prescribed manifold, other equipment may be used to obtain an equally satisfactory sample at a lower cost.	See the response to comment number 23.
25	6.1	S14, S12	It is suggested that the requirement be set at ± 20% of isokinetic. The proposed ± 10% of isokinetic flow rates is unnecessarily restrictive and will result in many repeat sampling runs. Since most particulate emissions from the roof monitors are less than 5 microns in size and thus behave essentially the same as a gas, the requirement for ± 10% of isokinetic flow rates is not warranted.	Agree. This suggestion has been incorporated into the reference method.
26	6.5	S12	The entire area of the monitor is used in the calculations from equation 14-2. This creates a higher estimate of fluoride losses through the roof than actually occurs since a large part of the roof monitor at Ormet is over passageways which contain lower concentrations of fluoride than that sampled over the pots.	The roof monitor in this example need not be performance tested because it is part of an existing facility. In the event that a similar structure is built in the future, it would be possible to obtain approval to modify the reference method so that unbiased test results may be obtained. See the response to comment number 1.

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Number	Section	Commentator	Comment	Response
27	Method 14	S21	Considering the hardware and specialized equipment necessary together with the questionable degree of reliability in the emission rate figure, the sampling system in Method 14 cannot be economically justified. Method 14 does not provide isokinetic sampling, uses an inaccurate sampling technique and provides only an estimate of emissions.	The Agency has concluded that Reference Method 14 will provide a good measurement of emissions from roof monitors. In addition, since the manifold may now be constructed of aluminum instead of the previously required stainless steel, the overall economic impact of Reference Method 14 has been reduced.

III. Reference Methods 13A and 13B Experience with Sampling Train

Reference Methods 13A and 13B specify fluoride sampling and analysis procedures applicable to testing of primary aluminum plants and phosphate fertilizer plants. The methods were promulgated with standards of performance for the phosphate fertilizer industry on August 6, 1975 (40 FR 33152). A common fluoride sampling train is utilized in the methods and a schematic diagram of it is reprinted on the following page. The diagram shows two possible filter locations, one between the third and fourth impingers and the other before the first impinger.

During EPA's fluoride emissions tests at aluminum plants, a glass fiber filter was used and was located before the first impinger. However, the promulgated version of the methods specifies a Whatman paper filter instead of the glass fiber filter. The reason for this is that glass fibers themselves contain fluorides which, along with particulate fluorides captured by the filter, appear in the laboratory analysis. To correct for this, fluorides contained in glass fiber filter blanks were measured and subtracted from the analysis fluoride values to obtain the actual amount of fluoride collected in the sampling train. When sampling fluorides in low concentrations, the filter fluoride content may represent a significant percentage of the total fluoride analyzed and, thereby, present a potential source of imprecision. To improve precision, a paper filter was specified in the methods.

Recent results of limited testing involving the paper filter and a gas stream containing relatively low fluoride concentrations suggest that, when the paper filter is located before the first impinger, some fluorides which pass through the filter are retained on the glass frit filter support. This apparently results in fluoride sample loss and "low-biased" test results. EPA is continuing to investigate this phenomenon in an attempt to accurately quantify its effect and, if appropriate, will revise the reference methods in the future. In the interim, compliance tests conducted with the paper filter located before the first impinger may tend to yield results more favorable to the source owner or operator than tests conducted with the filter between the third and fourth impingers.

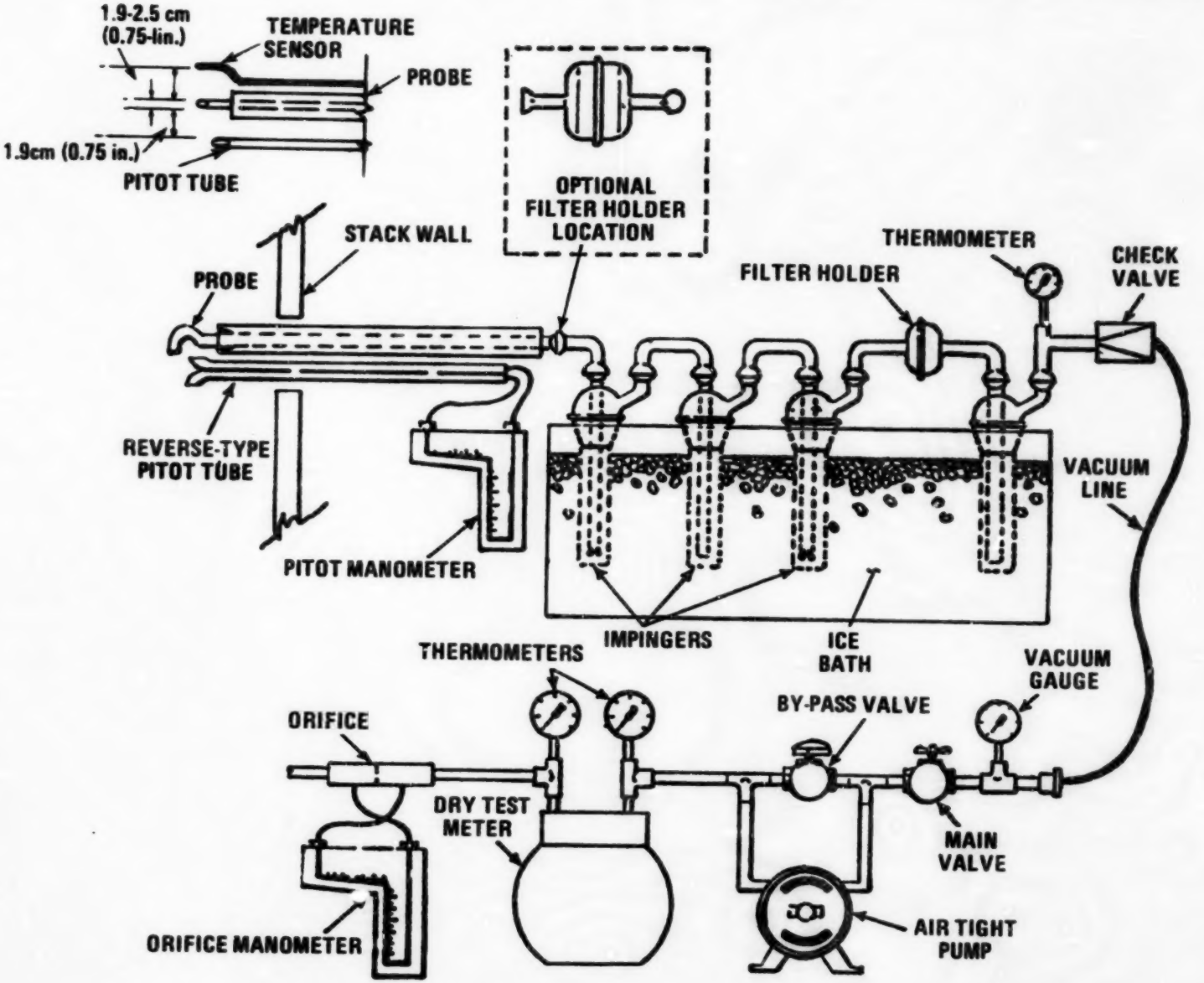

Figure 13A-1. Fluoride sampling train.